SILICA-GERMANIA-TITANIA WAVEGUIDES

ABSTRACT OF THE DISCLOSURE

Germanium-silicon oxide, germanium-silicon oxynitride and silica-germania-titania materials and oxynitride materials suitable for fabricating optical waveguides for liquid crystal based cross-connect optical switching devices have a refractive index of from about 1.48 to about 1.52 at 1550 nm, and a coefficient of thermal expansion at room temperature of from about $3 \times 10^{-6}\,^{\circ}C^{-1}$ to about $4.4 \times 10^{-6}\,^{\circ}C^{-1}$. The compositions are adjusted so that the refractive index of the germanium-silicon oxide, germanium-silicon oxynitride or silica-germania-titania material is closely matched to the refractive index of a typical liquid crystal material whereby improved optical performance of a liquid crystal based cross-connect optical switching device is achieved. The coefficient of thermal expansion of the germanium-silicon oxide, germanium-silicon oxynitride, or silica-germania-titania material is closely matched to the coefficient of thermal expansion of silicon, whereby strain induced birefringence caused by thermal stresses is reduced or avoided.